Abstracts of two Papers on the Orionids.

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ABSTRACTS

OF

TWO PAPERS

ON

THE CRINOIDS

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On the Nomenclature of the Plates of the Crinoidal Calyx.[1]

According to the present system of nomenclature there are two distinct sets of plates in the calyx of the Crinoids, to which the name *basals* is given. In *Platycrinus*, and in all those forms in which there are only two sets of plates in the calyx, the upper set were called *radials* by Müller, while he termed the lower set, resting on the upper stem segment, the *basals*. This was perfectly correct, for their position is interradial, and they correspond in every respect to the basals of *Pentacrinus*, the calyx of which genus was taken by Müller as a type on which he based his analyses of the calyx in all the other Crinoids.

In *Cyathocrinus*, however, there are two rows of plates below the radials, and the plates in the lowest of these were called basals by Müller because they rest on the upper stem-joint. Nevertheless, they are not homologous with the basals of *Pentacrinus* and *Platycrinus*, because they are radial in position. But intervening between them and the radials is a second set of plates (the so called parabasals or subradials), which alternate with both series, and are therefore interradial. I regard these plates as the true basals, while the lower (radial) set are homologous with the under basals of *Encrinus*, which were discovered by Beyrich. They are absent in the *Apiocrinidæ*, except perhaps in *A. Murchisonianus*, in all the recent species of *Pentacrinus* and in most of the fossil species, but they occur in *P. briareus* and in *P. subangularis*, where they have been wrongly described as the basals. This name, however, really belongs to the next series of plates, the so called parabasals, or subradials, which are inter-radial like the basals of *P. caputmedusæ*, and pierced like them by bifurcating canals, so that there is no doubt as to the homology of the two series.

The American palæontologists have sometimes followed Beyrich and sometimes followed Müller in their system of nomenclature. For example, *Heterocrinus* has two rows of plates below the radials which are variously called (1) subradials and (2) basals, or (1) basals and (2) sub-basals. The relative positions of these two rows are always the same, the upper (subradials or basals) being interradial, and the lower (basals, or sub-basals), being radial. As the former (interradial) series represents an important element in Echinoderm morphology, being homologous with the (likewise interradial) genital plates of the urchins and star-fishes, and is also of great morphological importance in the Crinoids themselves, it is very desirable that it should always bear the same name; and also that this name, *basals*, should not be used for plates which are neither interradial in their position nor constant in their occurrence. Similarly-named parts are usually supposed to be homologous; but if we give the same name to plates which are radial in one species and interradial in another, we disregard the principles of homology altogether, and introduce unnecessary confusion into the study of echinoderm morphology.

Beyrich has already remarked on this and has led the way towards a more rational and scientific nomenclature, by introducing the name '*under-basals*' for the radially situated plates which occur beneath the true basals of *Encrinus*.

If it be objected that these under basals, resting as they do upon the upper stem-joint, form the true base of the calyx, let us retain the name basals for this radial series, and call the upper (interradial) series the sub-radials, as is generally

[1] See Report, 1879, p. 333.

done at present. This, however, would necessitate our discarding the name basal altogether for such forms as *Pentacrinus caputmedusae*, &c., and, as it was first used for the lower row of plates in the calyx of this species, such a step would be inconvenient. The fact remains that the lowest part or base of the calyx is formed in some Crinoids by interradial, and in others (the minority) by radial plates; and the precise nomenclature we employ is not of much consequence. The important point is that homologous parts should be similarly named, and that parts which are not homologous should not receive the same name as if they were so. In the latter case, Echinoderm morphology, and especially that of the Crinoids, becomes greatly confused. We cannot then say that the basals of the Crinoids are homologous with the genital plates of the urchins and starfishes. One set of plates so-named does answer to this description, but the other set does not, for it is altogether unrepresented in the other Echinoderms.

The Nervous System of Comatula.[1]

Although there is a close histological resemblance between the ambulacral nerves of the starfishes and Crinoids, there is one important point of difference between them. The ambulacral nerves of the starfishes, at any rate of the Ophiurids, send off branches to the muscular bundles which connect successive joints of the rays, and effect the movements of the animal. The swimming movements of *Comatula* are far more active than the movements of any starfish, and are also performed with a singular regularity, while they are effected by the combined contraction of several hundred pairs of muscles; but no branches are traceable from the ambulacral nerves on to these muscles, such as are known in the Ophiurids.

Dr. Carpenter's experiments at Naples have shown that these muscles are under the influence of a governing centre which not only regulates their contractions, but co-ordinates these contractions in the most remarkable manner; and that this centre is situated in the fibrillar envelope of the chambered organ, while the axial cords of the rays and arms are the channels by which the influence of the centre is communicated to the muscles.

This experimental evidence as to the nervous nature of the axial cords is further supported by the results of anatomical investigation. Sections show that these axial cords give off branches regularly in the centre of each segment of the arms and pinnules; and that while some of them ramify upon the ends of the muscular bundles, others are traceable into the small marginal leaflets bordering the ambulacral grooves, where they break up very minutely and become lost. It has also been discovered that in many tropical *Comatulæ*, which have an excentric mouth, more or fewer, sometimes even more than half of the arms, which come off from the aboral side of the disc, have no ambulacral nerve at all, although the dorsal axial cord gives off its two pairs of branches in the usual way. In one large species from the Philippines, with nearly 200 arms, this condition is not limited to the aboral arms only, but occurs on some of the arms on each radius, while the others have the usual groove and subjacent ambulacral nerve.

These facts are strongly indicative of the nervous nature of the axial cords, although Claus and Gegenbaur in their recently published text-books make no mention of this view at all, and describe the nervous system of *Comatula* as essentially similar to that of the starfishes. It would seem, however, that while the ambulacral nerve of the Ophiurids supplies the muscles as well as the tentacles, these functions are more differentiated in the far more active Crinoids. The axial cords of this group appear to be the principal motor nerves as far as the skeleton is concerned, while the ambulacral nerves supply the tentacles only, possibly having some influence on the slow creeping movements which the isolated disc has been observed to perform. Why should we deny the nervous nature of the axial cords, simply because our doing so would clash with our preconceived notions as to what the Crinoids ought to be, in order to agree with the views on Echinoderm morphology which were adopted without a sufficient knowledge of the anatomy of this most interesting group?

[1] See Report, 1879, p. 418.

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